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Ted Saarikko

Faculty of Social Sciences, Department of Informatics, Umeå, Sweden, ted.saarikko@informatik.umu.se

Katrin Jonsson

Umeå university, Umeå, Sweden, katrin.jonsson@umu.se

Thommie Burström

Hanken Svenska handelshögskolan, Helsinki, Finland, thommie.burstrom@hanken.fi

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TOWARDS AN UNDERSTANDING OF ENTREPRENEURIAL ALERTNESS IN THE FORMATION OF PLATFORM ECOSYSTEMS

Complete Research

Saarikko, Ted, Umeå University, Umeå, Sweden, ted.saarikko@informatik.umu.se

Jonsson, Katrin, Umeå University, Umeå, Sweden, katrin.jonsson@informatik.umu.se

Burström, Thommie, Hanken School of Economics, Helsinki, Finland,
thommie.burstrom@hanken.fi

Abstract

In platform ecosystems, the platform provider seeks to derive increasing returns over time as the ecosystem of backing actors grows more numerous. While a growing body of research has addressed the ecosystem strategies of large enterprises, less attention has been paid to small firms in the role of platform providers. As small firms do not possess the resources of large enterprises, they are not in a position to ignore the importance of immediate returns needed for the viability of the firm. In a case study, we study the entrepreneurial alertness of a small technology-based firm in promoting a platform for machine-to-machine communication. Our results suggest that balancing increasing and immediate returns requires a variety of entrepreneurial activities that encompasses strategic foresight and systemic insight on one hand, and explorative and exploitative actions on the other. This paper contributes to our understanding of platform ecosystems by addressing the strategies of a small firm as an emerging platform provider.

Keywords: Platform ecosystems, entrepreneurial alertness, small and medium sized enterprises, case study

1 Introduction

In platform ecosystems (Gawer & Cusumano, 2002; Ceccagnoli, Forman, Huang & Wu, 2012) the platform leader seeks to gain increasing returns over time by creating conditions for two-sided network effects (Eisenmann, Parker & Van Alstyne, 2006). With two-sided network effects, the platform's value to third-party providers and consumers depends on the number of actors on the other side of the network (Suarez & Cusumano, 2009; Cusumano, 2012). The focal issues for platform leaders are thus to encourage third-party innovations from complementary resources located outside the firm (Linder, Jarvenpaa & Davenport, 2003) and to attract end-users to the platform (Tilson, Lyytinen & Sorensen, 2010; Yoo, Boland, Lyytinen & Majchrzak, 2012). A common means to solicit initial interest is to lower the cost of entry for one side of the market, e.g. consumer, so that they will flock to the platform and thus compel third-party providers to pay a premium for access (Schilling, 2009). Another common approach is for the platform provider to supply first-party content that is sufficiently compelling to attract interest to the platform (Evans, 2009). Both strategies are associated with significant costs as the platform provider must either forgo profits during the initial diffusion of the platform, or devote time and resources to develop content that motivate its adoption.

Regardless of technical know-how (Audretsch, 2001), small enterprises lack the resources and installed base associated with the aforementioned strategies for platform development (Palmer, 2000). Small technology-based firms are perceived as high-risk ventures (Westhead & Storey, 1997) that are ill-suited to manage platform leadership (Zahra & Nambisan, 2012). As such, they are commonly limited to internal financing in their operational as well as strategic activities (Carpenter & Petersen, 2002). Hence, they have a palpable need to derive immediate returns from their technology investments if they are to remain viable. While literature on platform ecosystems suggest that platform providers need not be large or dominant actors (Iansiti & Levien, 2004), extant research tends to focus on the strategies of large platform leaders such as Intel (Gawer & Henderson, 2007), Cisco (Li, 2009), eBay (Lin & Damin, 2009), and Apple (Ghazawneh & Henfridsson, 2013). Given the substantial resources of these enterprises, it is unlikely that small firms will be able to promote platforms using the same strategies as their larger counterparts. What we have yet to explore is how emerging platform leaders can strategize to gain immediate *and* increasing returns on their investments.

In this paper, we turn to entrepreneurial alertness as a framework for understanding the strategizing of small technology-based firms under the formation of platform ecosystems. Entrepreneurial alertness (Kirzner, 1973, 1997; Sambamurthy, Bharadwaj & Grover, 2003) focuses on the ability to recognise pervasive knowledge deficiencies in the market and how they can be regarded as business opportunities (Smith & DeGregorio, 2001). We argue that the ability to explore appropriate strategies as well as leverage technological expertise is essential for the long-term relevance of a platform, while the ability to exploit these same capabilities is essential for the short-term viability of the firm. In order to further our understanding on how technology in general – and IT in particular – can contribute to platform ecosystem strategizing, we pose the following research question: *How do small enterprises balance immediate and increasing returns during the establishment and early growth of a platform ecosystem?*

To explore the research question, we conduct a case study of a small technology firm and its actions throughout the development of a platform for secure mobile communication while concurrently fostering a budding ecosystem of different services utilising the functionality of the platform. The paper begins with a review of extant research into platform ecosystems followed by an outline of entrepreneurial alertness as a theoretical framework. We then proceed to an account of our methodological approach, the object of our study, and the analysis of our findings. The paper concludes with a discussion and our conclusions.

2 Platform Ecosystems

The application of the ecosystem metaphor in a business context originates in the work of Moore (1993) who referred to loosely coupled business communities as ecosystems. A business ecosystem is composed of a network of organizations that collectively create an integrated co-evolving social system that focuses on creating value for customers (Moore, 1993; Basole, 2009; Gawer, 2009; Lusch, 2011). Iansiti and Levien (2004) describe that business ecosystems draw strength from variety, that is, opportunities for actors to occupy or even develop new niches and specialisations. Ecosystem literature can be stratified into a number of sub-categories, one of which is *platform ecosystems* that concerns the network of actors that interact via a platform (Gawer & Cusumano, 2002; Ceccagnoli et al, 2012). The platform itself may be defined as a “core” of fixed set of attributes that can be extended by applications or complements to the benefit of adopters as well as backing firms – commonly referred to as ‘complementors’ (Baldwin & Woodard, 2009). By encouraging third-party innovations from complementary resources located outside the firm, the platform owner essentially seeks to create a multi-sided market that becomes increasingly attractive over time as it attracts more users and content (Linder et al, 2003; Eisenmann, Parker & van Alstyne, 2009). The ability to attract interest and complementary innovations from resources outside the firm is essential to the development and sustainability of a platform (Gawer & Cusumano, 2002). A network of partners may be considered a “platform for platform design” (Le Masson, Weil & Hatchuel, 2009) that not unlike the platform artefact require apt strategies in order to identify roles, values and establish equitable streams of revenue.

A growing body of research has started to theorize about strategies relating to mature ecosystems enabled by influential platform leaders (Gawer & Henderson, 2007; Li, 2009; Lin & Daim, 2009; Ghazawneh & Henfridsson, 2013) that are in a favourable position to manage issues pertaining to technology evolution (Adomavicius, Bockstedt, Gupta & Kauffman, 2007), openness (Parker & van Alstyne, 2008; Eisenmann et al, 2009; West, 2003), platform diffusion (Schilling, 2009), and complementariness (Gawer & Henderson, 2007) from a position of resource abundance and the momentum that with an installed base.

While studies centred on preeminent platform leaders offer insight into how dominant actors can orchestrate an ecosystem in order to become keystones (Iansiti & Levien, 2004; Zahra & Nambisan, 2012), they offer little insight into the concerns of smaller actors and emerging ecosystems with the exception of emphasizing the importance of strong intellectual property rights (e.g. Tiwana, Konsynski & Bush, 2010; Ceccagnoli et al, 2012). Platform strategies typically require the provider to either seed the platform with original content that attracts interest, or apply asymmetric pricing, i.e. subsidise either consumers or complementors in order to increase the platform’s overall market penetration (Evans, 2009). Both approaches presume the availability of sufficient resources to absorb an initial loss which will be regained once the platform ecosystem gains momentum. While perhaps feasible for a large, diversified enterprise, such a strategy is beyond the capabilities of small technology firms that generally have trouble securing external funding as they are perceived as high-risk ventures (Westhead & Storey, 1997; Carpenter & Petersen, 2002). It is therefore likely that an SME seeking to promote a platform will need to do so while continuously operating in the black. The general lack of ex ante resources forces the small firm into a position more closely resembling that of an entrepreneur (e.g. Kirzner, 1973) than a platform leader. Rather than mimic the strategies of resource-laden platform leaders, small firms would arguably be better served by an entrepreneurial stance that reflects the inherent uncertainties of new technologies and fluidity of requisite resources (West & Meyer, 1998; Elfring & Hulsink, 2003). We therefore see potential in applying an entrepreneurial perspective to explore how small enterprises can pursue immediate and increased returns during the establishment and early growth of platform ecosystems.

3 Entrepreneurial Alertness

Recognizing and exploiting market opportunities through creation of new products, services, customers, markets and distribution channels are key activities for contemporary firms (Sambamurthy et al, 2003) sometimes referred to as strategic actions (Smith & DeGregorio, 2001). As firms may differ in market knowledge, i.e. relevant aspects of products, customer preferences and distribution channels (Grimm & Smith, 1997), they will not perceive opportunities in the same way (Kirzner, 1973). Entrepreneurial actions require alertness to unnoticed and unexploited opportunities. Zaheer and Zaheer (1997) define alertness as proactive attentiveness to information about the environment – to have “one’s antenna out”. Entrepreneurial alertness is thus crucial for a firm’s innovation activities and competitive actions. Sambamurthy et al (2003) extends the concept of entrepreneurial alertness from the original Kirznerian definition (Kirzner, 1973; Gaglio & Katz, 2001) with the ostensible intention to explicitly address information systems and information technology in contemporary firms. They do this by distinguishing two components of entrepreneurial alertness: strategic foresight and systemic insight. Strategic foresight is the ability to sense opportunities for improvement in the market, business environment or IT space. Systemic insight is the ability of a firm to connect digital options, agility capabilities and emerging market opportunities in forming their actions. Systemic insight enables firms to recognize and evaluate market opportunities with regards to different businesses, technologies, and competitive risks.

While Sambamurthy et al’s (2003) expanded conception of entrepreneurial alertness increases its relevance for technology as such; it requires further elaboration in order to be applicable for utilising technological know-how with regards to strategic action as well as balancing revenue streams to foster short-term viability in addition to long-term development. A potentially fruitful means to better address this context may be attained by incorporating perspectives from organisational actions (March, 1991) as well as dynamic capabilities (Teece, 2007) into entrepreneurial alertness. March (1991) distinguishes between exploration and exploitation as two tenets of organisational actions where exploitation includes processes related to refinement, production, efficiency, selection and execution, and exploration relates to search, variation, risk taking, experimentation, flexibility and discovery. Teece (2007) echoes March’s reasoning with the added twist of explicitly addressing the link between innovation and capitalisation, stressing that novelty does not translate to profit without a sense of purpose or utility.

Both March (1991) and Teece (2007) argue that organizations need to balance exploitation and exploration in their modus operandi. By permitting ourselves the added granularity of considering explorative as well as exploitative aspects of strategic foresight and systemic insight, we are in a better position to discern how experimentation and long-term development relate to capitalisation and short-term efficiency to create a mesh of strategic actions. Figure 1 represents our expanded view on entrepreneurial alertness.

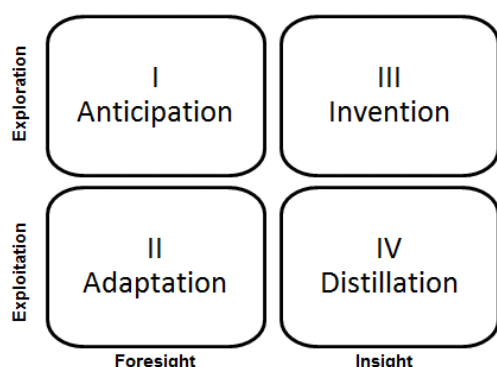


Figure 1. *Entrepreneurial alertness matrix.*

The first quadrant of our matrix is closely related to Kirzner’s (1973) original conception of entrepreneurial alertness in that it involves perception of pervasive knowledge deficiencies that give rise

to poor decisions or missed opportunities. In order to discern a state of disequilibrium, the firm must “scan” the market for situations where action or decision-making may be improved through additional information that can serve to reduce uncertainty or decrease ambivalence (Daft & Lengel, 1986). Scanning the market in this manner is a largely exploratory activity that does not delve deeper than to identify problems or issues that may be alleviated through judicious application of information technology. As these activities largely relate to potential avenues for future action, we consider this aspect of firm-level entrepreneurial alertness to be one of *anticipation* which is dependent upon entrepreneurial abilities rather than domain knowledge, corresponding to questions such as: What mechanisms does the firm employ to gather market knowledge?

Anticipation of disequilibria can give firms valuable clues as to viable areas of entrepreneurial activity. However, clues are not by themselves any basis for judicious action. The firm must first develop the nascent opportunity into a more tangible basis for action. The opportunity must first be clarified to a point where it may be considered a concrete goal or objective. With an objective in place, the firm can proceed to strategize regarding the actual work and resources needed to realise this goal. Again, this view is in keeping with Kirzner as he sees the entrepreneur as someone who marshals resources when they are needed rather than possesses them *ex ante*. We therefore consider the more exploitative aspects of strategic foresight as a matter of *adaptation* that addresses questions like: How does the firm develop new ends-means frameworks that conform to the specific opportunity?

As the moniker suggests, systemic insight is more closely aligned with specific domain knowledge than the more generalist entrepreneurial skill-set of sensing knowledge deficiencies. On a general level, we perceive systemic insight as keen understanding of the affordances of different technologies, i.e. its potential and its limitations (Hutchby, 2001). Furthermore, systemic insight may also be extended to include the ability to predict emergent properties that come to light when different technologies come together. We therefore characterise the more explorative aspects of systemic insight in terms of *invention* and utilise it as a means to answer questions such as: How does the firm avail itself of new technologies and innovations?

While a firm grasp of technological possibilities is valuable, one cannot hope to put it to good use without developing a suitable instantiation for its operationalization. Technologies are abstract and general whereas their application is specific and laden with contingencies. The firm must possess the requisite domain-level knowledge if it is to devise a suitable modality that will match technology with application. Insights into several domains can bring opportunities to repackage the same technology in different ways. Alternatively, the same modality may be sufficiently comprehensive to satisfy more than one domain. We consider this application of technology in a specific domain as a form of *distillation* where the entrepreneurial firm moves from general technology to specific instantiation. In doing so, we ponder questions like: How does the firm acquire the domain-level knowledge needed to appropriate value from its technical knowledge?

As we expand upon the work of Kirzner (1973) and Sambamurthy et al (2003), we are left with a more elaborate conception of the strategic actions that form the basis for firm-level entrepreneurial alertness. We now proceed to apply our framework in a case study.

4 Method

The objective of the present study is to address the question of how the actions of a small firm during the establishment of a platform ecosystem to gain immediate and increased returns may be informed via a construct based upon entrepreneurial alertness. We have pursued this line of inquiry using a single case study (Yin, 2009) centred on a firm that provides a platform for secure communication and act as a hub in an ecosystem of suppliers and customers. The study can be categorised as an explorative study intended to develop theory regarding a particular phenomenon which is in keeping with case studies’ potential for generalizability (Lee & Baskerville, 2003). The analysis of empirical material has been

conducted via a qualitative research process whereby the author collects and interprets data (Walsham, 2006) against a given theoretical framework. A qualitative approach based on interviews was motivated by the retrospective nature of the study and the initial unfamiliarity of the researchers with the specific business context. Interviews permit informed answers and access to the expertise of informants, enabling researchers “in-depth studies [...] in plain and everyday terms” (Yin, 2009, p. 6). Empirical data was gathered primarily through five separate interviews with employees, including the chief executive officer (two interviews), chief operation officer, business area manager, and area sales manager. The case study is part of a larger research project that provides additional information in the form of documentation pertaining to the platform as well as attendance in three meetings and workshops with representatives from the firm.

All interviews were conducted at the offices of the firm and ranged from 45 to 70 minutes in length. The interviews may be considered semi-structured (Creswell, 2007) as the interviewer prepared a number of questions beforehand, but also followed up on avenues of inquiry that were unknown prior to the interviews. Employing semi-structured interviews also served to mitigate the inherent dichotomy of interviews, i.e. the interviewer guides the conversation even though the interviewee possesses the sought information (Kvale & Brinkmann, 2009). A flexible research design was employed whereby each interview contributed not only to the gathering of empirical material, but also served to inform subsequent interviews. Following transcription, the empirical material was compiled and disassembled in an effort to match it with the theoretical framework used in this paper. The material was then reassembled thematically using the categories of the framework in an iterative fashion by the lead author and validated by the co-authors. As the number of interviews conducted is relatively small, no particular software or similar tool was used in the coding and analysis of the empirical material.

5 Case study

Our study centres on CommCo, an enterprise founded in 2000 that is located in northern Europe and currently houses a staff of 20+ employees. The company has developed a platform for machine-to-machine (M2M) communication, CommCoMobile, and cultivated a small but growing ecosystem of external service suppliers. CommCoMobile is composed of a communications platform that is physically installed into user systems where it serves as a link to back-office system(s) that host third-party services. The hardware may be integrated into localised systems using several means; including common interfaces like Ethernet and Universal Serial Bus (USB) as well as the more specialised Controller Area Network Bus (CAN bus) which is widely used in automotive applications. It also supports a range of wireless communication protocols as well as the Global Positioning System.

In essence, the platform may be described as a thin client (a specialised router) that provides a secure link between a localised unit (e.g. a vehicle) and a remote location (e.g. an office). Using this secure link, the user can access the localised unit remotely and gather data from its sensory devices, or issue instructions to any on-board control systems. As customers typically rely on CommCoMobile to continuously transmit data even under extreme conditions, high demands are placed upon physical resilience as well as availability. To this end, the platform hardware has been certified to comply with several international standards, including those set by the International Electrotechnical Commission (IEC) regarding heat, cold, vibration, shock and humidity.

In addition to services developed by CommCo themselves, other suppliers are also able to deliver their services via the platform following a process of certification and testing. CommCo typically form partnerships with these external suppliers that utilise their platform, making sure that the partners are able to deliver their service in exchange for a monthly fee. CommCo has made it an explicit policy to not develop any services that imitate or infringe upon partner services, instead prioritising the continued existence of partners and availability of their expertise. CommCo’s approach is somewhat unusual in that most competitors offer integrated solutions where one piece of hardware delivers one service supplied by one developer. The combination of reliable technology and a partnering strategy has made

it possible for CommCo to benefit from the innovative services provided by third-party developers and seize significant market shares in several markets. The turn-over of the M2M business area has increased by a factor of four between 2006 and 2012, from €1.25 million to €5.25 million.

6 Alertness in practice

We present the results of our study structured in accordance with our theoretical framework, using anticipation, adaptation, invention, and distillation as sub-headings.

6.1 Anticipation

Commco has been subject to market pressures that have been brewing for many years. Since the 1990's, the life-span of communications solutions has decreased from some 20 years to 30 months resulting in decreasing interest in high-end products that will soon become obsolete. Also, globalisation has opened the gates to worldwide competition where staying competitive is often a matter of cutting costs. The combination of a changing technical paradigm and increasing competition was a clear sign that CommCo had to act if it wanted to remain in business. The response was to move away from products to systems and services as they are harder to mimic or import from halfway across the globe.

While the initial steps largely entailed adapting their technical knowledge to a new business-paradigm, CommCo also started working more closely with customers in order to gain much needed insight into the industries and business segments where they operate. Although time-consuming, it has proven to be a significant factor in the ability to successfully market CommCoMobile directly to end-users rather than via integrators or other third parties who then absorb much of the profit. Direct interaction with customers does however require a more direct value proposition since they want transparent solutions that do not require specialised technical knowledge.

"...nobody is really in the market for a platform. What they want is a solution. [...] If you then look at public transportation – the bus-ecosystem – there we've learnt how the industry works in the Nordic countries in order to supply the functionality that they actually want from this platform. In doing so it has suddenly turned into a solution."

- Business area manager, CommCo

In addition to working more closely with customers, CommCo adopted a partner strategy in 2005 whereby the company actively sought out firms that could add value as well as diversity to their portfolio. Over time, cooperation grants an understanding of how CommCo may better support new services or how suppliers may augment one another. For instance, a partner strategy enables the ecosystem of firms to handle contracts that are too big for any one supplier to manage single-handedly. Moreover, small firms can often afford to specialise in niche markets and services as they are not burdened by costs of large facilities, administrative services or similar overhead expenses.

"We see everything that we think and do as a network, and I think...that is the way one should proceed to survive the future. These [big] companies that want it all, they won't be able to pull it off as things are moving too fast [...] you have to find the cutting-edge and then fit the puzzle together."

- CEO, CommCo

The advantage of partnering is mutual. Partners are often relatively small firms that are focused on creating value-added services based upon their ability to extract useful information from user data. The physical linkage and transmission of data from user context to back-office system is usually not a part of their core competence or their business model. The reliable communications platform supplied by CommCo essentially enables partners to largely black-box this problem and focus on what data is being transmitted rather than how it is transmitted. As platform provider, CommCo collects a fee from partners who utilise CommCoMobile. If the customer is primarily interested in a particular partner-service,

CommCo essentially comes along for the ride since the service is provided via their platform. This can bring further business opportunities since it is easy to add more services once platform is physically integrated in the user system.

“Piggy-backing” on partners also furnishes CommCo with opportunities for learning. As services gradually proliferate through different industry segments, partners gain a greater understanding of how each respective industry works. The improved acumen is then used to develop their services, e.g. by adding new functionality or tuning it to fit other customers. Any significant changes trickle down to CommCo in the form of new platform-requirements that provide valuable input with regards to market trends. CommCo is also able to gather first-hand knowledge as their staff is usually involved in the physical integration of their platform into customer systems, providing a sense of the practical challenges inherent to different user contexts.

As part of an ecosystem strategy, CommCo has also been very open to engaging with universities and participating in cross-industry initiatives. Although there are usually no clear benefits at the outset, the increased exposure has paved the way for several opportunities that have evolved into long-term business relationships with regional customers.

6.2 Adaptation

The transition from products to services represented a significant reorientation in not only how CommCo operates, but also what it actually produces. CommCo managed this challenge in two-stages that encompassed approximately three years of concerted effort. The relative nimbleness of a small organisation is a significant factor in preserving its entrepreneurial spirit as personnel often intermingle as needed which brings great responsiveness to situational needs. However, the flipside of informal procedures have yielded an overdependence on certain employees. In order to come to grips with this, CommCo initially worked introspectively, focusing on establishing a firmer sense of structure as well as fostering a corporate culture that acknowledged the new platform-paradigm as well as the product-skills needed to design the platform. The underlying motivation was one of long-term quality assurance as it was believed that a positive climate is an essential enabler of company performance.

Following that, CommCo started paying more explicit attention to working with the outward perception of the firm. They invested time, money and effort in acquiring an ERP system, a support-system, getting ISO-certified, achieving a high credit rating, and continuously developing delivery systems. This is not only motivated by quality control, but it also a cost of doing business as corporate customers hold stability and dependability in high esteem. Tokens such as ISO-certification and high credit rating afford the company a level of credibility that is rare in an industry where start-ups proliferate.

Concurrent with these institutional efforts, CommCo also started more explicitly altering the business model, emphasising services as the actual commodity with the product qua digital platform as an enabler. One of the more salient changes was foregoing one-off sales of products to a monthly subscription of services which has allowed CommCo to normalise their revenue stream. In selling products, the cash-flow is completely dependent on the volumes that ships each month. In comparison, fees solicited from services can be projected with greater accuracy and are not as dependent upon physical stock of merchandise. Additionally, using services funded by monthly subscriptions rather than selling one-off hardware and software-licenses was more palatable to customers seeking to avoid large up-front investments. CommCo still charge enough for the product to make a profit, but the ambition is to keep the retail price as low as possible in order to make for an appealing offer. In effect, the transition to services may be seen both as a means to bring financial stability as well as a way to appease customer preferences.

In building and managing its ecosystem, CommCo has gone through considerable lengths to make sure that the individual firms are able to operate knowing that its partners are not trying to copy or supplant its intellectual property. Nor is any form of exclusivity required, leaving the individual suppliers to act

as partners within this ecosystem as well as utilise other platforms e.g. on different markets. While this “managed” approach may clash somewhat with the ecosystem metaphor, it is necessary in order to attain and maintain a diverse set of partners.

“...let us compare the ecosystem to an aquarium. The fish [...] represent partners. In that metaphor we are the aquarium. We have to make sure that nourishment and oxygen is supplied. We cannot let any predator get in, because it will eat the other [fish]. Translated into business we have to ensure that everyone in the ecosystem makes money. We’re not supposed to hoard all of the profits. Compare this to a traditional approach where you work with a supplier that you squeeze to the very limit in order to make as much as you can. An ecosystem doesn’t work that way because then the fish starves and disappears.”

- CEO, CommCo

The services that CommCo offer are typically developed or brought into the ecosystem in cooperation with customers or based upon their specific needs. The undertakings range in scope from overall commitment to developing and delivering a service, to more limited tasks that are limited to specific tasks or functions. Working with customers entails clarifying an often ill-defined problem, deconstructing it into its parts, identifying any causal factors and then conceptualising services that can alleviate or solve the problem. Once services have been identified, they are matched to the current offerings available via the platform ecosystem. In cases where the required services are not available, CommCo scans the market for providers who offer services that match the perceived requirements. If a supplier is found, CommCo initiates contact and investigates the possibility of incorporating that supplier into the ecosystem using the initial business case as an incentive. Hence, partnerships are typically formed based upon concrete business opportunities rather than potential advantages or strategic aspirations.

One might however discern a slight disadvantage in service-orientation with regards to doing business overseas. In selling products, the company has managed to establish itself in some 20 countries. Exporting systems and services has proven more cumbersome as there are significant barriers, e.g. certifications, which are difficult to overcome for a small firm. Thus far, CommCo has managed to find partners in a handful of European countries, but moving to other continents would require significant resources to deal with the additional bureaucratic strain.

6.3 Invention

CommCoMobile qua device was designed in 1997 and has since received two major redesigns. When the first iteration was introduced to the market in 2000, the original intent was not to construct a platform for services, but rather to offer a robust and secure solution for wireless communications. At the time, the versatility of the product was a novelty in itself.

“...if you look back at the first generation...the reason that it looked the way it did is because of the tools and technology that were available at the time. We didn’t have 3G-networks and the like. It was limited by the technical possibilities available back then. [...] You could say that it was largely a prototype or proof-of-concept that everything could work together.”

- COO, CommCo

The initial version of CommCoMobile was essentially a continuation of the product-based business model that drew upon the firm’s technical skills and experience of communications systems. However, CommCo soon began to see the advantages of expanding upon the functionality of the product. The impetus for this move was not a matter of strategy, but rather convenience as service and configuration of the platform involved significant amount of expenses in terms of sending technical staff out in the field. Hence, the first few years of CommCoMobile’s existence saw economising on maintenance as a primary driver for its development. The following years saw development of platform functionality that

was more related to adding value for users, such as the introduction of “managed services” in 2003, which was a basic form of what is commonly referred to as cloud services today. The transition to the second generation of CommCoMobile entailed scrapping the entire architecture and starting from scratch with a new design, new hardware, and new software. While costly in terms of time and resources, it was necessary in order to accommodate new components, e.g. an improved GPS transponder and new I/O-ports requested by customers. CommCo also furthered modularisation of their services by deconstructing the service-model into four layers: Data transmission, administration and monitoring, data processing and analysis, and high-level services that are often unique to particular business segments. These layers form a kind of hierarchy where data transmission provides the base and high-level services the apex. As the first three layers are closely related to the platform itself, CommCo manages these areas in-house whereas high-level services are a blend of partner contributions and in-house development. The interdependencies between layers can become bit convoluted as customers sometimes require specialised hardware in order to enabling high-level services.

“[...] we’ve devoted our efforts on infrastructure, a platform where we can add content – content being services. But in this case the sensors will be plugged in down here in order to add content higher up.”

- Business area manager, CommCo

While the second generation of the platform was scalable in terms of functionality, it did not scale in terms of performance, meaning that certain desired services could not be accommodated. The subsequent transition to the third (current) generation of hardware did not entail a complete overhaul, but did require scrapping roughly 50% of the previous architecture. CommCoMobile may now be considered a flexible platform that is scalable in terms of functionality as well as performance, granting it the capabilities needed for it to function as dependable infrastructure for services. As it stands, future improvements to the mobile platform should proceed at only minor expense. The current software platform also lends itself to running on other hardware, enabling new technical possibilities.

6.4 Distillation

CommCo regards problems for which there is no extant solution as an opportunity to land a contract as well as add a unique service to the platform. Unlike general technologies, services are often specific to a particular context which makes speculative development a risky venture. Hence, CommCo rarely develops anything unless it is motivated by a specific business opportunity. In an effort to streamline and simplify their offerings, CommCo strive to package their skills and technical solutions as products that can be communicated to different types of customers with relative ease. However, try as one might, solutions can often be labour-intensive to bring about as CommCoMobile must be physically integrated in user systems in order to serve its purpose. As CommCo market their platform to several different industries, the realities of integrating systems that were never intended to be integrated are a frequent source of concern.

“It’s always tough to ‘productify’ solutions. For instance, one particular solution is intended to work with a truck – we’ve done that before. But it’s pulling a salt spreader from the 1980’s. We need [to pick up] signals from that as well, so we’re back to customisation again. [...] That’s the way it is with our customers – machinery from the 80’s meets tablets from last year.”

- Business area manager, CommCo

The impetus for platform development is largely derived from CommCo’s close ties with partners and customers. Requirements or inquiries from either party represent opportunities for new knowledge pertaining to technologies as well as their application. While this may expend resources in the short run, organisational knowledge as well as platform services are renewable resources that can be used again and again. I.e. a technical skill that was developed based on one particular customer or business area may also be adapted for a completely different context. The importance rebranding generic technologies

or functions as context-specific solutions is paramount to CommCo as customers cover a wide range of industries, including private security, forestry machinery, public transportation and logistics. The majority of application contexts involve supervising mobile units (e.g. cars or trucks), but there are also customers that value the resilience of the hardware and thus utilise the platform in situations where physical access is a concern, e.g. for monitoring high-voltage electrical wiring. Understanding the diverging priorities of different customers marks a laborious but unavoidable step in bridging the gap between technology and application.

“The classic example is the children’s room with pieces of [building blocks] all over the floor. You can build anything with it, but you need to know what to build, how to do it, where to find the pieces and so on. The next step is to package it in a box. The third step is to categorise the different models with a description and a picture. It’s about knowing the industry – for instance what the bus driver needs. Before you know that you cannot package a solution.”

- Business area manager, CommCo

Familiarising oneself with different industries as well as needs of different business segments has the added boon of naturalising interaction with customers. The need to discuss technical details has diminished, leaving the concerned parties free to focus on the practicalities of introducing a service or set of services rather than debate technologies and communication protocols. Although the difference in discussing technical specifications vis-à-vis function might be trivial in some cases, it can at other times be quite profound as CommCo has been well ahead of the curve in working with remote access, hosting services online and similar applications. As these types of services gradually gain legitimacy, CommCoMobile has been able to reap the benefits of offering a mature turnkey solution to services and functionality that customers only now start to appreciate and utilise.

“What’s happening now...I mean, we’ve been working with this business model since 2004. The driver now is Office 365. It has suddenly become a legitimate way to do business. We’re seeing actors that would never have bought our cloud-services suddenly asking for them.”

- CEO, CommCo

7 Discussion

We have studied the journey of CommCo, a small product-based enterprise that through a gradual process of service-orientation has emerged as provider of a platform for machine-to-machine communication used in several industries. As a small technology-based firm, CommCo needed immediate returns sufficient to maintain short-term viability of the firm, but also a long-term reorientation in order to maintain the relevance of their offering when faced with a changing business environment. In our analysis, we have employed entrepreneurial alertness as a theoretical perspective, expanding upon previous work by Kirzner (1973) and Sambamurthy et al (2003) by constructing an entrepreneurial alertness matrix with four types of activities: anticipation, adaptation, invention, and distillation. The notion of entrepreneurial alertness appears a suitable lens for our purposes as platforms qua multi-sided markets (Eisenmann et al, 2006) facilitate interaction between different actors and increase the visibility of available options.

7.1 Application of foresight

Technology firms occupy an industry that is inherently unstable, riddled with uncertainties, and subject to frequent change (Westhead & Storey, 1997; West & Meyer, 1998). An ecosystem mind-set seemingly offers significant potential for specialised firms to minimise their risks through parsimony of resources coupled with focus on customer value (Moore, 1993). Individually, niche actors are only able to operate within very limited parameters. However, through participation in an ecosystem of partners, a firm can leverage the aggregate set of services, utilise the functionality of the platform, and still enjoy the

institutional advantages of being a small firm, e.g. specialisation, nimbleness and small overhead. As partnering entails long-term relationships, partner firms not only contribute to the portfolio of services, but also enhance the ecosystem's powers of perception and overall value as each firm moves in different circles and interacts with different actors (Boudreau & Hagiu, 2009). As platforms form the hubs of platform ecosystems, the platform provider is favourably positioned to pick up on new trends – either directly through co-development with partners or indirectly via functional requirements. Indeed, the ability of a platform provider to explore trends and developments can be seen as a requirement rather than fortuitous advantage as viability of the platform is contingent upon its continued relevance in the face of new business opportunities (Gawer, 2009; Cusumano, 2012). A platform that does not enable the ecosystem to adapt to new business opportunities does not provide the exploitative potential for either entrepreneurship or generativity.

An open platform-approach where platform provider, partner, and customer form a relationship based on tangible solutions appears a viable means to gradually build a platform ecosystem in a situation where there is no dominant actor nor clearly established delivery mechanism. The partner and customer see the platform as an easily exploitable turnkey to deliver services, while their utilisation of the platform serves as a basis for ecosystem growth as well as further business opportunities – e.g. additional services to the same customer or the same service to other customers. A platform ecosystem based on openness, loose couplings, and concrete business opportunities is very much in keeping with the entrepreneurial approach of accessing networked resources when needed (Kirzner, 1973; Elfring & Hulsink, 2003), but marks a departure from literature on platform leadership that seeks loyalty in backers (Gawer & Henderson, 2002; Basole & Karla, 2011; Zahra & Nambisan, 2012).

7.2 Application of insight

The inclusion of systemic insight into entrepreneurial alertness allows us to analyse domain knowledge as an essential component of strategic actions. While the exact role of domain knowledge varies between different industries, it is vital when we are dealing with phenomena as versatile and rapidly evolving as information technology. Ensuring that one is working with the appropriate tools is not only a matter of exploration, but also experimentation in order to discern the feasibility and affordability of technologies. However, following an increasing service-orientation, neither technology nor cost drives adoption when users explicitly seek transparent solutions that satisfy problems rather than function (Gawer, 2009). The ability to exploit IT rests on a process of sense-making (Weick, Sutcliffe & Obstfeldt, 2005) whereby our present understanding of a given context determines our ability to adapt a generic technology to a specific application. The transition from generic to specific involves two distinct steps. First, the platform artefact must convey its purpose and benefit to the concerned party on his/her terms. Second, the platform must add value by bridging the gap between technical potential and user functionality.

The importance of context cannot be overstated as it illustrates the duality of domain knowledge for platform providers. It is simply not enough to merely understand technology itself or limit one's scope to internal concerns as was the case in Sambamurthy et al's (2003) view on systemic insight. The *raison d'être* of platforms is the ability to black-box certain activities, leaving the adopter free to perceive it merely as enabling infrastructure or even ignore it altogether (Baldwin & Woodard, 2009). In order to achieve this, the platform provider must take an active interest in the target industries and explore situated trends, priorities and preferences as part of systemic insight. While this level of insight into particular domains is incongruent with Kirzner's (1973) notion of the entrepreneur as a consummate generalist, it is pertinent to platform providers if they are to derive increasing returns from an ecosystem of partners rather than merely supply parts to other entrepreneurs that possess the requisite skills.

7.3 Implications for theory and practice

Extant platform strategies typically favour strategies that require significant up-front investment (Evans, 2009) which is typically beyond the ability of small firms (Palmer, 2000). Our study serves to illustrate

an alternate approach that draws upon entrepreneurial alertness where entry into the ecosystem is motivated by concrete benefits for complementors as well as customers. Under these circumstances, a platform is arguably less dependent upon attaining a critical mass of adopters in order to succeed, but is able to balance financial viability and long-term growth by extracting rents from both sides of the exchange.

We do not suggest that our view on entrepreneurial alertness is the only plausible mechanism for understanding the activities of SMEs. We do however argue that explicit attention to domain knowledge in addition to strategic actions carries tremendous potential for entrepreneurship in IT. Likewise, incorporating explorative and exploitative activities can inform our understanding how platform ecosystems can be formed under conditions where the long-term development of the platform artefact and short-term viability of the platform provider are equally germane. We may also better understand how the ostensibly distinct capabilities of strategic foresight and systemic insight are relate in practice. As we move from foresight to insight and exploration to exploitation, we are in effect moving from the general to the specific. Strategic foresight pertains to detecting and diagnosing systematic deficiencies in decision-making either in terms of ambiguity or uncertainty. While it would be an exaggeration to suggest that foresight is a universal skill in the sense that all deficiencies are similar, the ability to detect persistent problems is considerably more generic when compared to the domain-specific insight needed to actually solve them. Likewise, explorative activity is general in the sense that it represents a collective understanding of a trend, a phenomenon, or a technology. As such, explorative activities can bring opportunities for business or development to our attention, but require additional refinement and specificity in order to be exploited.

The present study marks a first step towards an improved understanding of entrepreneurial alertness in relation to information systems research. Further research is however needed to determine its further relevance, e.g. entrepreneurship in other ecosystems or its applicability for larger platform providers.

8 Conclusions

Extant platform strategies are typically based on the ability of the platform provider to defer initial profits in favour of increasing returns. Although viable for large or influential enterprises, such an approach is beyond the means of small enterprises as they must be mindful of immediate returns in order to ensure the viability of the firm. Using entrepreneurial alertness as a theoretical framework, we have conducted a case study of a small enterprise in its transition from product retailer to platform provider. Our findings suggest that concrete business opportunities are a feasible basis on which to recruit complementors as well as drive platform development as the benefits are tangible rather than speculative. The ability to identify and seize upon opportunities requires a set of activities that amount to leveraging technical know-how against market deficiencies on the one hand, and balancing long-term potential with short-term applicability on the other. As such, the paper contributes to our understanding of entrepreneurial activities in platform ecosystems.

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